

### ABSTRACT

The present patent deals with new catalysts for the Catalytic Partial Oxidation (CPO) of methane to synthesis gas (hydrogen and carbon monoxide), a gas mixture widely employed in industry. The discovered perovskite catalysts allows to carried out the process at low residence time obtaining a long time stability in the reaction conditions notwithstanding the high temperature reached in the reactor. The fundamental component of the catalyst is the perovskite structure  $[A_z A'_{1-z}][B_{1-x-y} Ni_x Rh_y]O_{3-\delta}$  obtained using mainly La, Sr, as A and A' cation sites (A, A': actinide and/or lanthanide, elements and/or elements from Group I and II) and mainly Fe, Ni, as B cation sites (B : transition metal element and/or element from Group III to V). The active phases Ni and/or Rh are inserted in the perovskite structure during the preparation and are reduced in situ or before the catalytic tests. The insertion of the Rh and Ni in the perovskite structure allows an high dispersion of the metal on the surface and increases its interaction with the perovskite matrix ensuring high activity and stability. The presence of both Rh and Ni is necessary to reach high catalytic performances since the reducibility and the stability in the reduced state is affected by the contemporary presence of the cations. The choice of the A, A' elements are critical for the initial performances and the stability under time on stream of the catalyst for CPO reaction. The element are chosen in order of preference in the lanthanide family (La, Ce, ...) and the Group II.